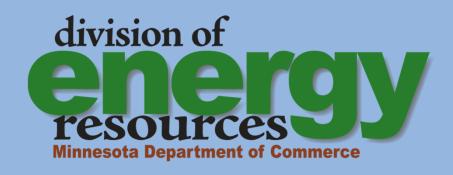
Conservation Applied Research and Development (CARD) Grant Update

CIP Collaborative Forums
April 2013

Mary Sue Lobenstein CARD R&D Program Administrator



Who we are...

- Minnesota Department of Commerce
 - Division of Energy Resources
 - State Energy Office
 - Providing energy information for over 35 years...
 - Energy conservation, efficiency, & renewables
 - Through technology, analysis, grants, programs, & public outreach
 - Data, reports, publications, presentations, website, call center, training, public events



Conservation Applied Research & Development

- Background
- Recent Results
- Ongoing Projects
- Going Forward



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Fundamental Change

The greatest impact of the 2007 NGEA was the change from a 1.5% spending goal to a 1.5% savings goal.





Conservation Applied Research & Development

CARD purpose to help MN utilities achieve 1.5 % savings goal by:

- Identifying new technologies or strategies to maximize energy savings;
- Improving effectiveness of energy conservation programs;
- Documenting CO₂ reductions from energy conservation programs.

Minnesota Statutes §216B.241, Subd. 1e.



CARD RFP Process



- 1. Identify funding topics
 - Review CIP priorities & needs
 - Input from utilities & other stakeholders
- 2. RFP issued (~ annually)
- 3. Responders submit proposals
- 4. Proposals reviewed & evaluated
 - CIP priorities
 - Content, scope of work, work plan
 - Responder's qualifications, skills & experience
 - Anticipated impact of project outcomes
 - Budget
- 5. Grantees selected, contracts negotiated and work begins max 3 year timeline



CARD RFP Awards to Date



- Four funding cycles:
 2008, 2009-10, 2011, 2012
- 180 proposals
- 45 projects funded
- Committed ~ \$10.6 million

Grants awarded to:

- Minnesota utilities
- Local & national contractors & service providers
- Universities & non-profits
- Government agencies



Awards by Building Sector



EMERY III II	
SECTOR	# of Projects



Residential	7
Multifamily	3
Commercial	16
Agriculture	2
Industrial	4

Multiple Sectors





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Conservation Applied Research & Development

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CARD Recent Results



• Examples:

- Cx Auto. Daylighting Controls (ECW)
- Efficient Street Lighting (EMS)
- Health Care Facility Behavior Pilot (Class5)
- Kitchen Exhaust HR (Northwind)
- Tech. Ref. Manual Review (Franklin)
- ESP® Development & Deployment (Energy Platforms)

All final reports available on DER website



Commissioning (Cx) of Automatic Daylighting Controls

Energy Center of Wisconsin February 2013

20 spaces

Energy Use Estimated

- Baseline conditions
- Current operation
- Optimized Cx/RCx
- Significant savings for optimized Cx/RCx



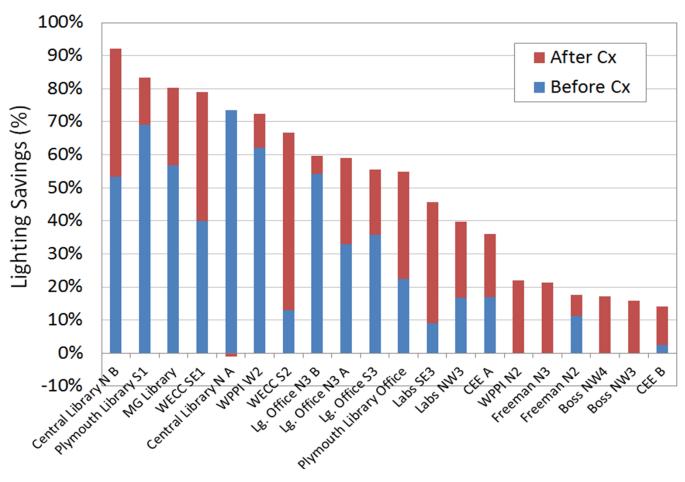
Mpls. Central Library (courtesy ECW)

 Includes guidelines for successful implementation, startup & Cx/RCx



Commissioning (Cx) of Automatic Daylighting Controls

Results





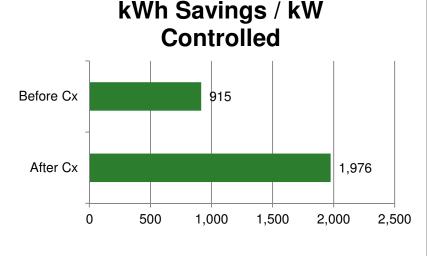
Commissioning (Cx) of Automatic Daylighting Controls

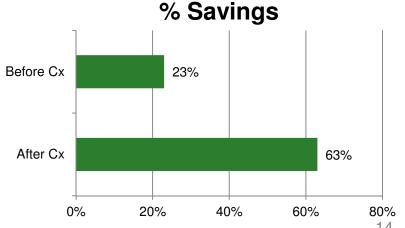
Average Savings

Note: Includes HVAC savings



Plymouth Library (courtesy ECW)







CIP Implications Daylighting Controls

- New construction or major renovation opportunity
- Importance of Cx done right to attain optimal savings
- Re-commissioning opportunity with existing systems



Investigation of Efficient Street Lighting

Energy Management Solutions

December 2012

- Full Discussion of Induction & LED technologies
- "How-to" manual for LED selection
- Economic analysis of replacing HID with LEDs



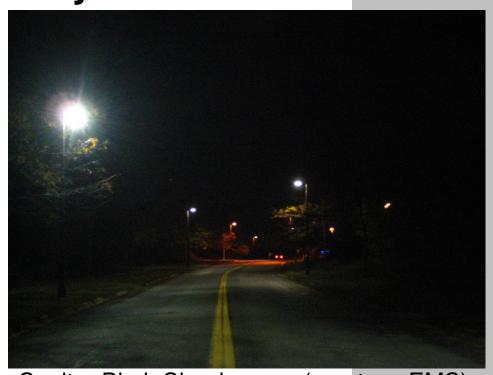
Coulter Blvd, Chanhassen (courtesy EMS)

Case study (Chanhassen)



Investigation of Efficient Street Lighting

- Simple paybacks 8 to 12 years
- Internal ROR
 8 10.5% over
 22 year lifetime
- Superior light quality improves safety & reduces light pollution



Coulter Blvd, Chanhassen (courtesy EMS)

Specification Form, Savings Calculator & Other Resources on DER's website



CIP Implications EE Street Lighting

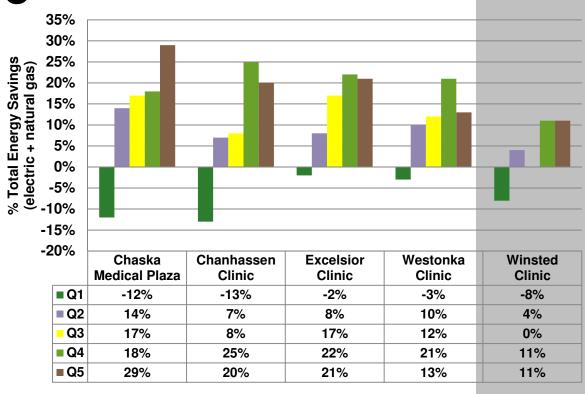
- Good savings potential with wide application
- Utility-led pilot program could help develop details of best way to incorporate into CIP



Health Care Facility Behavior Pilot

Class5 – Ridgeview Medical Center February 2013

- 5 sites
- 13 buildings
- 15 months
- Average use reduced by 6% overall
- Saved more than \$75,000 to date



CIP Implications Behavior Programs

- Senior-level support
- Internal coordinator with support of a strong core team
- Need for M&V
- Multi-year effort



Kitchen Exhaust Heat Recovery to Service HW

Northwind Sailing November 2012

- Case study
- Small, seasonal café



Angry Trout Café (courtesy: G. Wilkes)



HR Units (courtesy: G. Wilkes)

- HR supplied 20 30% of SHW requirements
- Reduced exhaust duct cleaning frequency
- Operated smoothly once startup issues resolved



Kitchen Exhaust Heat Recovery to Service HW

	Α	В	С	D	E
Seating Capacity	75	75	75	150	300
Meals/Day	2	2	3	3	3
Days open/Year	182	365	365	365	365
Installed Cost	\$10,660	\$10,660	\$10,660	\$19,200	\$35,200
Annual Savings	\$62	\$392	\$606	\$1,268	\$2,620
Payback (Years)	172	27	18	15	13

- Uneconomical in small, seasonal restaurant
- Paybacks of <15 yrs projected in larger facilities



CIP Implications Kitchen Exhaust HR

- Custom project
- Target larger facilities
- All other energy efficiency options completed
- Careful evaluation of savings
 & payback estimates
- Engineering support for installation & Cx





Review of MN Technical Reference Manual



Franklin Energy Services September 2012

- Evaluated & updated
 - Assumptions
 - Formulas
 - Measure lifetimes
 - Peak coincidence factors
- Energy codes & standards
- Continual improvement process
- TRM incorporated into ESP®



ESP® Development & Deployment

Energy Platforms May 2012

- Reporting & data validation
- DB of CIP & sales data
- Program management tools
- Integrated TRM
- Virtual measure designer

Going Forward

- Planning tools
- User-defined forms





Older CARD Results



- Examples
 - Residential Plug Loads (ECW)
 - Energy Conservation Opportunities for MN Manufacturers (MnTAP)
 - Savings & Performance of Natural Gas Residential Tankless Service Water Heaters (CEE)
 - Emerging EE Financing (Franklin)
 - Many others...

Final reports available on DER website



Conservation Applied Research & Development

- ✓ Background
- **✓** Recent Results
- Ongoing Projects*
- Going Forward

*Including 2012 Funding Cycle



Ongoing CARD Projects: Multiple Sectors

- Smart Grid Pilot
- Energy Savings from DR & LM
- Condensing Boiler Optimization
- Heat Pump WH Potential
- Window Retrofit Technologies
- •Net Metering Rules & Standby Rate Analysis to increase CHP



Ongoing CARD Projects: Residential & MF Sectors

Green = Field Study
Blue = Program Pilot
Purple = White Paper

 Residential Ground Source Heat Pump



- Reducing Energy Cost of Effective Ventilation in MF
- MF Benchmarking



Ongoing CARD Projects: Commercial Sector



- Large Building Energy Leakage
- Drainwater Heat Recovery
- Variable Refrigerant Flow
- Advanced RTU Controls
- Duct Leakage in Large Buildings



Ongoing CARD Projects: Commercial Sector

- Convenience Store Pilot
- Restaurant EE Pilot
- Study of Single Recommendation vs. List
- City-Wide Behavior Pilot
- Cost Effective Restaurant Cx
- Integrating BM & Green Button Initiative
- Data Center EE



Ongoing CARD Projects: Ag & Industrial Sectors



- Dairy Cooperative Partnerships
- Advanced HR for Large Boilers
- Energy Management Team
 Coordinator in industrial facilities
- Motivating Manufacturing EE through Lean Green Process



Conservation Applied Research & Development

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- **✓** Recent Results
- **✓ Ongoing Projects**
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- Continue to fund R&D through RFP process
- Priority remains to help utilities meet 1.5% savings goal
- Dissemination of results
 - Final Reports
 - Newsletter articles
 - Webinars
- Stakeholder input





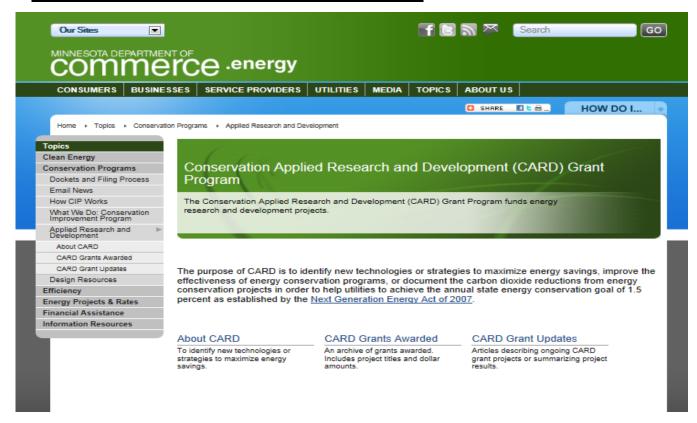
- 2013 CARD RFP in process
- Next posting spring 2013
- Stakeholder input still welcome
- Topics
 - Targeted to sectors or utility types
 - Market transformation
 - Quality control issues
 - Promoting CHP
 - Financing issues





Link to CARD Home Page

http://mn.gov/commerce/energy/topics/conservation/Applied-Research-Development/





Link to Recent Reports (< 1 year)

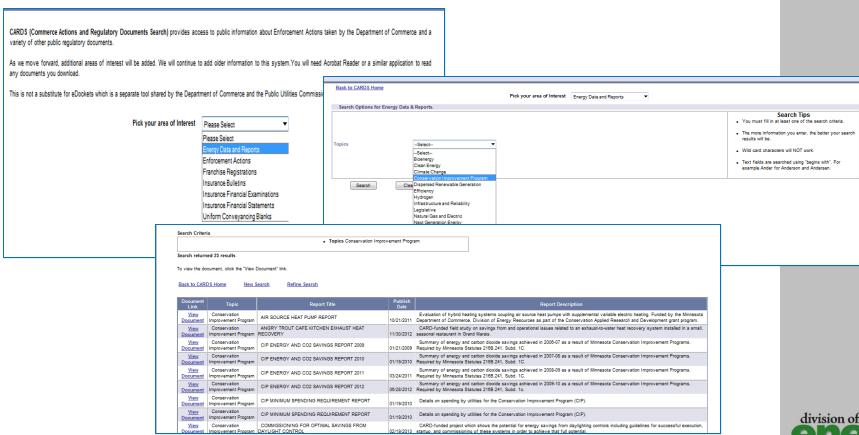
http://mn.gov/commerce/energy/topics/resources/Reports
 -Data/Energy-Reports.jsp





Link to Documents Search Page

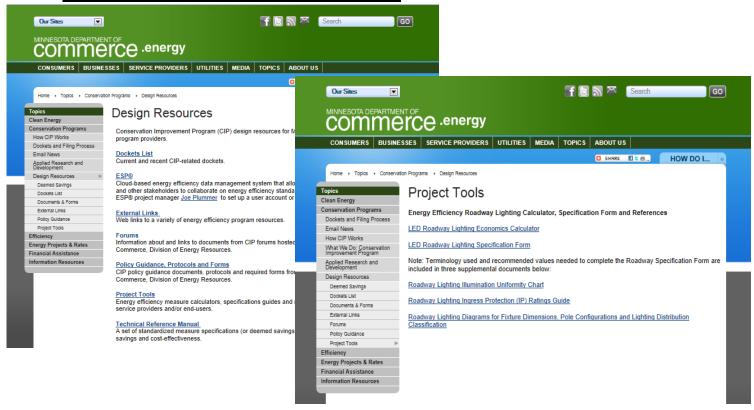
https://www.cards.commerce.state.mn.us/CARDS/





Link to Design Resources

 http://mn.gov/commerce/energy/topics/conservation/D esign-Resources/index.jsp





Questions?

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